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**MISSION OPERATIONS AND DATA SYSTEMS
DIRECTORATE**

**Landsat 7 Image Assessment System
(IAS)
Interface Definitions Document (IDD)**

December 1996

Draft



National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland

Draft

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Prepared by:

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Abstract

This Interface Definitions Document (IDD) presents the functional, performance, operational, and design requirements for the interfaces between the Landsat 7 Image Assessment System (IAS) subsystems.

This document provides a current understanding of the definition of the interfaces between the IAS subsystems. This interface definitions document will be baselined by the IAS during the IAS detailed design activities.

Keywords: *Interface Definitions Document (IDD), Landsat 7 Image Assessment System (IAS)*

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Contents

SECTION 1. INTRODUCTION

1.1 Purpose	1-1
1.2 Scope.....	1-1
1.3 Organization	1-1
1.4 Applicable Documents	1-1
1.5 Specification Documents	1-1
1.6 Reference Documents	1-2

SECTION 2. PCS AND ALL IAS SUBSYSTEMS

2.1 PCS and DMS	2-1
2.1.1 Data_Availability_Note	2-1
2.1.1.1 Description	2-1
2.1.1.2 Format	2-1
2.1.1.3 Data Transfer	2-1
2.1.1.4 IPC Mechanism	2-2
2.1.2 Process_Status	2-2
2.1.2.1 Description	2-2
2.1.2.2 Format	2-2
2.1.2.3 Data Transfer	2-2
2.1.2.4 IPC Mechanism	2-2
2.1.3 Process_Data_Request	2-2
2.1.3.1 Description	2-2
2.1.3.2 Format	2-2
2.1.3.3 Data Transfer	2-3
2.1.3.4 IPC Mechanism	2-3
2.2 PCS and RPS.....	2-3
2.2.1 Processing_Parameters.....	2-3
2.2.1.1 Description	2-3
2.2.1.2 Format	2-3
2.2.1.3 Data Transfer	2-5
2.2.1.4 IPC Mechanism	2-6
2.2.2 Process_Status	2-6
2.2.2.1 Description	2-6
2.2.2.2 Format	2-6
2.2.2.3 Data Transfer	2-6
2.2.2.4 IPC Mechanism	2-6
2.3 PCS and GPS	2-6
2.3.1 Processing_Parameters.....	2-6

Draft

2.3.1.1 Description	2-6
2.3.1.2 Format	2-6
2.3.1.3 Data Transfer	2-9
2.3.1.4 IPC Mechanism	2-9
2.3.2 Process_Status	2-9
2.3.2.1 Description	2-9
2.3.2.2 Format	2-10
2.3.2.3 Data Transfer	2-10
2.3.2.4 IPC Mechanism	2-10
2.4 PCS and E&A	2-10
2.4.1 Analyst_Notification	2-10
2.4.1.1 Description	2-10
2.4.1.2 Format	2-10
2.4.1.3 Data Transfer	2-10
2.4.1.4 IPC Mechanism	2-10
2.4.2 Work_Order_Instruction	2-11
2.4.2.1 Description	2-11
2.4.2.2 Format	2-11
2.4.2.3 Data Transfer	2-11
2.4.2.4 IPC Mechanism	2-11

SECTION 3. E&A AND RPS, GPS AND DMS

3.1 E&A and RPS	3-1
3.1.1 Characterization_Calibration_Statistics	3-1
3.1.1.1 Description	3-1
3.1.1.2 Format	3-1
3.1.1.3 Data Transfer	3-5
3.1.1.4 IPC Mechanism	3-5
3.1.2 Image_Data	3-5
3.1.2.1 Description	3-5
3.1.2.2 Format	3-5
3.1.2.3 Data Transfer	3-5
3.1.2.4 IPC Mechanism	3-6
3.1.3 Reports	3-6
3.1.3.1 Description	3-6
3.1.3.2 Format	3-6
3.1.3.3 Data Transfer	3-6
3.1.3.4 IPC Mechanism	3-6
3.2 E&A and GPS	3-7
3.2.1 Characterization_Calibration_Statistics	3-7
3.2.1.1 Description	3-7
3.2.1.2 Format	3-7
3.2.1.3 Data Transfer	3-8
3.2.1.4 IPC Mechanism	3-8
3.2.2 Image_Data	3-8
3.2.2.1 Description	3-8
3.2.2.2 Format	3-8
3.2.2.3 Data Transfer	3-8
3.2.2.4 IPC Mechanism	3-8
3.2.3 Reports	3-8

Draft

3.2.3.1 Description	3-8
3.2.3.2 Format	3-9
3.2.3.3 Data Transfer	3-9
3.2.3.4 IPC Mechanism	3-9
3.3 E&A and DMS	3-10
3.3.1 L0R_QC_Statistics	3-10
3.3.1.1 Description	3-10
3.3.1.2 Format	3-10
3.3.1.3 Data Transfer	3-10
3.3.1.4 IPC Mechanism	3-10
3.3.2 Reports	3-10
3.3.2.1 Description	3-10
3.3.2.2 Format	3-10
3.3.2.3 Data Transfer	3-11
3.3.2.4 IPC Mechanism	3-11

SECTION 4. DMS AND RPS/GPS/E&A

4.1 DMS and RPS/GPS/E&A	4-1
4.1.1 Image_Data	4-1
4.1.1.1 Description	4-1
4.1.1.2 Format	4-1
4.1.1.3 Data Transfer	4-1
4.1.1.4 IPC Mechanism	4-1
4.1.2 Ancillary	4-1
4.1.2.1 Description	4-1
4.1.2.2 Format	4-2
4.1.2.3 Data Transfer	4-2
4.1.2.4 IPC Mechanism	4-2
4.1.3 Cal_Parm_File	4-2
4.1.3.1 Description	4-2
4.1.3.2 Format	4-2
4.1.3.3 Data Transfer	4-2
4.1.3.4 IPC Mechanism	4-2

SECTION 5. RPS AND GPS

5.1 RPS and GPS	5
5.1.1 Lev_1R_Image5.1
5.1.1.1 Description5.1
5.1.1.2 Format5.1
5.1.1.3 Data Transfer5.1
5.1.1.4 IPC Mechanism5.1

Draft

LIST OF TABLES

2-1. DATA AVAILABILITY NOTICE INTERFACE	2-1
2-2. PROCESS STATUS INTERFACE	2-2
2-3. PROCESS DATA REQUEST INTERFACE	2-2
2-4. PROCESSING PARAMETERS INTERFACE - RADIOMETRY	2-3
2-5. PROCESS STATUS INTERFACE - RADIOMETRY	2-6
2-6. PROCESSING PARAMETERS INTERFACE - GEOMETRY	2-7
2-7. PROCESS STATUS INTERFACE - GEOMETRY	2-10
2-8. ANALYST NOTIFICATION INTERFACE	2-10
2-9. WORK ORDER INSTRUCTION INTERFACE	2-11
3-1. CHARACTERIZATION/CALIBRATION STATISTICS INTERFACE RADIOMETRY	3-1
3-2. IMAGE DATA INTERFACE - L0RC & 1R	3-5
3-3. REPORTS - RADIOMETRY	3-6
3-3. CHARACTERIZATION/CALIBRATION STATISTICS INTERFACE GEOMETRY	3-7
3-4. IMAGE DATA INTERFACE - 1G.....	3-8
3-5. REPORTS - GEOMETRY	3-8
3-6. L0R QC STATISTICS INTERFACE	3-9
3-7. REPORTS INTERFACE	3-10
4-1. IMAGE DATA INTERFACE - L0R.....	4-1
4-2. ANCILLARY INTERFACE	4-2
4-3. CALIBRATION PARAMETER FILE INTERFACE.....	4-2
5-1. LEVEL 1R IMAGE INTERFACE.....	5-1

Draft

Section 1. Introduction

1.1 Purpose

This Interface Definitions Document (IDD) presents the interface requirements between the Landsat 7 Image Assessment System (IAS) subsystems. It will be an evolutionary document that will be updated with increasing detail as development progresses through critical design.

1.2 Scope

This document provides the functional, performance, operational, and design requirements for the IAS subsystem interfaces. This document is intended for all parties requiring such information, including system engineers and system designers responsible for implementing the interfaces, and the system maintenance personnel responsible for maintaining the interfaces.

1.3 Organization

This document is organized into five sections. Section 1 is the introduction to this document. The remaining sections are organized into four general categories.

The first category includes all Process Control Subsystem (PCS) interfaces. The PCS controls the management of the work order flow executed by the other four subsystems. These subsystems are the Data Management Subsystem (DMS), the Radiometric Processing Subsystem (RPS), the Geometric Processing Subsystem (GPS) and the Evaluation & Analysis (E&A) Subsystem. The subsystem interfaces are described in Section 2 through 5. The interfaces are identified to the level of completeness currently available to the designers.

1.4 Applicable Documents

The following documents contain additional details regarding the IAS, the Landsat 7 System and Project, and external systems.

1.5 Specification Documents

The following documents provide the basis for developing the IAS subsystem interface definitions presented in this document.

1. Computer Sciences Corporation, *Landsat-7 Image Assessment System (IAS) System Design Specification*, December 1996.
2. National Aeronautics and Space Administration (NASA), Goddard Space Flight Center (GSFC), 430-15-01-001-0, *Landsat-7 Image Assessment System (IAS) Element Specification*, October 1996.

Draft

3. NASA/GSFC, 430-11-06-007-0, *Landsat 7 OR Distribution Product Data Format Control Book HDF Version*, July 2, 1996 Review Draft.
4. NASA/GSFC, 430-15-01-002-0, *Landsat 7 Calibration Parameter File Definition*.
5. NASA/GSFC, 430-L-0002-H, *Landsat 7 System Specification*, August 1994.
6. Computer Sciences Corporation, *Landsat-7 Mission Operations Center (MOC) to Image Assessment System (IAS) Interface Control Document (ICD)*, November, 1995.
7. NASA/GSFC, 514-1ICD/0195, *Interface Control Document (ICD) Between the Image Assessment System (IAS) and the Landsat-7 Processing System (LPS)*, January 31, 1996.
8. Hughes Information Technology Systems, 209-CD-013-003, *Interface Control Document Between EOSDIS Core System (ECS) and the Landsat 7 System*, March 1996.

1.6 Reference Documents

The following documents contain additional background information related to the Landsat-7 mission and to IAS.

1. NASA, *Landsat 7 Level 1 Requirements*, Draft Issue, August 8, 1994.
2. AlliedSignal Technical Services Corporation, *Landsat 7 Detailed Mission Requirements*, March 1996.
3. Martin Marietta Astro Space (MMAS), *Landsat-7 Image Assessment System Operations Concept*, September 1994.
4. NASA GSFC, 430-11-06--003-0, *Landsat 7 System and Operations Concept*, October 1994.
5. MMAS, CDRL No. A104, *Space Segment Calibration Plan*, August 1994.
6. MMAS, 23007702, *Landsat 7 System Data Format Control Book (DFCB) Volume 4 - Wideband Data*, December 2, 1994.
7. MMAS, CDRL #A058, 23007610A, *Landsat-7 Program Coordinate System Standard, Rev. B*, December 1994.
8. United States Geological Survey (USGS)/National Oceanic and Atmospheric Administration (NOAA), *Index to Landsat 7 Worldwide Reference System (WRS)*, 1982.

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Section 2. PCS and All IAS Subsystems

The internal communications between the PCS and all IAS subsystems are through the IAS database. The database stores all user work order parameter inputs and updates to work order queues. The IAS database maintains the sequence of scripts to be processed for a specified procedure. It also maintains descriptive data that relates processing files that are needed for a given work order. Locations of flat files, such as image files, calibration files and reports, as well as trending statistics, are stored in the database. The IAS subsystems use the IAS database to extract the data needed for their processing.

2.1 PCS and DMS

2.1.1 Data_Availability_Notece

2.1.1.1 Description

The Data_Availability_Notece interface notifies the PCS that a L0R product has arrived and is available for use in a work order. The image data has been validated and the PCD and MSCD files have been updated. After the L0R quality check is completed, the DMS enters the date that the L0R product is available to be processed in the work order table in the database.

2.1.1.2 Format

Table 2-1. Data Availability Notice Interface

Parameter	Type	Comment
File Name		Image file, PCD, MSCD
File Location		Image Directory
Quality Check		Overall quality of data
Date Received		Date L0R product available to PCS for processing
Error_Flag		Allow continued processing of erroneous errors (yes, no)

2.1.1.3 Data Transfer

Input to PCS from DMS. Sent to PCS from DMS upon arrival of requested data from EDC DAAC and after quality check.

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2.1.1.4 IPC Mechanism

The Data_Availability_Notify parameters are passed to PCS from DMS via the database. DMS uses a database stored procedure to write the Data_Availability_Notify to the database. PCS uses a stored procedure to periodically poll the database and retrieve the Data_Availability_Notify. The PCS checks the date received field and matches the input file to the work order by the L0R file name and scene identifier. The procedure for incoming L0R products that have no work order is TBR.

2.1.2 Process_Status

2.1.2.1 Description

The Process_Status interface provides processing status to PCS regarding image subsetting.

2.1.2.2 Format

Table 2-2. Process Status Interface

Attribute	Type	Comment
Proc_Status	integer	Exit status of process

2.1.2.3 Data Transfer

Input to PCS from DMS. Sent to PCS upon completion of subsetting process.

2.1.2.4 IPC Mechanism

PCS begins each work order script by specifying DMS to perform image subsetting. When the DMS child process exits, UNIX returns the process exit status to PCS. The Process_Status is captured in the DMS process exit status.

2.1.3 Process_Data_Request

2.1.3.1 Description

The Process_Data_Request interface communicates with the DMS to add, delete or subset files and to allocate space for anticipated storage. It also requests the Calibration Parameter File to be sent to the EDC DAAC on a periodic basis.

2.1.3.2 Format

Table 2-3. Process Data Request Interface

Parameter	Type	Comment
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Proc_Parms		subset, add, delete, distribute files
Res_Mgt_Dir		space allocation

2.1.3.3 Data Transfer

Output from PCS to DMS.

2.1.3.4 IPC Mechanism

The Process_Data_Request interface is sent to the DMS via the database. PCS uses a database stored procedure to write the Process_Data_Request to the database. DMS uses a database stored procedure to periodically poll the database and retrieve the Process_Data_Request.

2.2 PCS and RPS

2.2.1 Processing_Parameters

2.2.1.1 Description

The Processing_Parameters interface contains processing parameters for Level 1R and radiometric calibration processing in RPS.

2.2.1.2 Format

The list of parameters in Table 2-4 are only those derived from algorithms completed to date.

Table 2-4. Processing Parameters Interface - Radiometry

Parameter	Type	Comment
File Name		Files needed for processing
Band No.		
Work Order Id		
Script Name		
Characterize Random Noise		
Nr. of starting pixel	integer	Default is 1 for earth scenes; ~2600 for FASC
Nr of swaths to process	integer	Default is 1 for FASC; 374 for other scenes

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Nr of swaths to overlap	integers	Default is 0
Histogram analysis		
Number of scans in window to be used for calculation		Default is 374 - one scene
Number of scans to overlap between windows		Default is ~0
Number of starting pixel		Default is 1
Number of pixels for each calculation		Default is normal scan length
Reference detector		One per band
Saturation bin threshold		Default is 1000
Adjacent bin threshold		Default is 10
Number of adjacent bin to test		Default is 2
Dropped Lines		
Perform_Dropped_Line_Correction	logical	
Substitute/Interpolate	character	
Dropped_Line_Filled_Values	byte	Line of different length for different bands 1 per each detector of each band, the line length may also depend on data (?)
Detector Inoperability		
Perform_Inoperable_Detector_Correction	logical	
Substitute/Interpolate	character	
Inoperable_Detector_Filled_Values	byte	1 per each detector of each band
Detector Saturation		
Perform_Detector_Saturation_	logical	

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Correction		
Substitute/Interpolate	character	
Detector_Saturation_Filled_Values	byte	1 per each detector of each band
Characterize Detector Operability		
Upper and Lower Limits of Saturation Spectral Radiance	float	Per band, low gain & high gain modes
Characterize & Evaluate Relative and Absolute Radiometry		
Gain source		Per detector of band
Ratios		
Output Type		Plot, table, both
Plot/table time scale		Long or short term trends
Least squares trend fit		
Radiometric Correction		
Gain switch		Non-default/biases per detector
Gain correction		per detector
Pre-launch gains and biases		per detector
Default or preferred gain and bias source		per detector
DN to radiance conversion factors		Per band
Radiance scale factor exponent		Per band
Detector Temperature		
Reference gains and temps		
Temp sensitivity detector selection		
ETM+ Model		From TMINIT 1G processing

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2.2.1.3 Data Transfer

Output from PCS to RPS. Initiated based on work order schedule and input of processing parameter values.

2.2.1.4 IPC Mechanism

The Processing_Parameters interface is passed from PCS to RPS via the database. The PCS user interface uses database stored procedures to write Processing_Parameters to the database. The RPS uses a database stored procedure to retrieve Processing_Parameters from the database. The PCS passes the work order identifier and script name as environmental variables.

2.2.2 Process_Status

2.2.2.1 Description

The Process_Status interface contains status of processing regarding radiometric algorithms and Level 1R image generation.

2.2.2.2 Format

Table 2-5. Process Status Interface - Radiometry

Parameter	Type	Comment
Proc_Status	integer	Exit status of process

2.2.2.3 Data Transfer

Input to PCS from RPS. Sent upon completion of given process.

2.2.2.4 IPC Mechanism

When a UNIX process exits, an exit status is returned to its parent process. The PCS starts all RPS processing. As each RPS process exits, UNIX returns the process exit status to PCS.

2.3 PCS and GPS

2.3.1 Processing_Parameters

2.3.1.1 Description

The Processing_Parameters interface contains processing parameters for geometric calibration and characterization used in 1G processing in GPS.

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2.3.1.2 Format

The list of parameters in Table 2-6 are only those derived from algorithms completed to date.

Table 2-6. Processing Parameters Interface - Geometry

Parameter	Type	Comment
Work Order Identifier		
Script Name		
TMINIT		
input_image	char 256	Input image file name to be initialized
row_number	long 3	Row numbers from the input image to process
meta_opt	char 3	Option to validate the metadata (yes,no)
FDF_name	char 256	FDF ephemeris file name (option)
print	char 100	Print options (terminal,line_printer,file_name)
TMRECTIFY		
input_image	char 256	Input image to generate grid for
proj_code	double 1	Projection code
zone_code	double 1	UTM zone code
ellip_code	double 1	Ellipsoid code
datum_code	double 1	Datum code
proj_parms	double 15	Projection definition information
proj_dist	double 2	X and Y projection distances
proj_unit	char 6	Units the projection distances are in
corner_coors	char 38x4	Frame coordinates that define the output space
coor_unit	char 3	Units of corner_coors (deg,min,sec,dms,pro)
ls_coors	long 2	Line/sample coordinates (corner_coors option)
nl	long 1	Number of lines in output space (corner_coors option)

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ns	long 1	Number of samples in output space (corner_coors option)
geo_grid	char 256	Output grid file name
pixsiz	float 1	Output pixel size
bands	long 9	Band numbers to process
print	char 100	Print option (terminal, line_printer, file_name)
TMRESAMPLE		
input_image	char 256	Input image file name to be resampled
bands	long 9	Which bands to process
output_image	char 256	Output image file name
input_grid	char 256	Input grid file name
terrain_flag	long 1	Flag whether or not to apply terrain correction
in_dem_name	char 256	Input dem image file name (co-registered)
terr_tbl_flag	long 1	Flag to read or calc table of terrain offsets
terr_tbl_name	char 256	Name of optional input terrain table (elevation offsets file)
delay_flag	long 1	Flag to apply detector delays
odtype	char 4	Output data type (byte,i*2,i*4,r*4,...)
ext_flag	long 1	Flag for saving the extended image
out_ext_name	char 256	Output extended image file name
window_opt	char 3	Window option (in,out)
window	long 4	Window (sl,ss,nl,ns)
resample	char 5	Resampling method (NN,CC,MTF,TABLE)
input_weight	char 256	Input resample weight table name
interp_limit	float 1	Interpolation limit value
pccalpha	float 1	Parametric cubic convolution alpha parameter
backgrnd	float 1	Grey level fill value outside input image
trend_file	char 256	Scan gap statistics file name

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PRECISION		
input_image	char 256	Input image file name
input_tpl	char 256	Input tie point location file
geo_grid	char 256	Input geometric grid file
out_grid	char 256	Output precision geometric grid file
output_tpl	char 256	Output tie point location results file
min_corr	float 1	Minimum correlation strength
max_diff	float 1	Maximum differences between TPLs
fit_method	char 7	Fitting method (paraboloid, gaussian, reciprocals, no_fit)
confirm_flg	char 3	Confirmation flag (yes,no)
out_residual	char 256	Output residual file name
out_solution	char 256	Output precision solution file name
GCP_outlier	char 100	GCP outlier tend/report file
parm_flg	char 7	Parameterization flag (att_orb,eph_yaw,both)
time_flg	char 3	Time rate estimation option (yes,no)
max_iter	long 1	Maximum iterations
att_apri	char 256	Attitude apriori information file name
eph_apri	char 256	Ephemeris apriori information file name
obs_apri	char 256	Observation apriori information file name
eph_file	char 256	Intermediate ephemeris file name
print	char 100	Print option (terminal, line_printer, file_name)

2.3.1.3 Data Transfer

Output from PCS to GPS. Initiated based on work order schedule and input of processing parameter values.

2.3.1.4 IPC Mechanism

The Processing_Parameters interface is passed from PCS to GPS via the database. The PCS user interface uses database stored procedures to write Processing_Parameters to the database. The GPS uses a database stored procedure to

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retrieve Processing_Parameters from the database. The PCS passes the work order identifier and script name as environmental variables.

2.3.2 Process_Status

2.3.2.1 Description

The Process_Status interface contains status of processing regarding geometric algorithms and Level 1G image generation

2.3.2.2 Format

Table 2-7. Process Status Interface - Geometry

Attribute	Type	Comment
Proc_Status	integer	Exit status of process

2.3.2.3 Data Transfer

Input to PCS from GPS. Sent to PCS from GPS upon completion of given process.

2.3.2.4 IPC Mechanism

When a UNIX process exits, an exit status is returned to its parent process. The PCS starts all GPS processing. As each GPS process exits, UNIX returns the process exit status to PCS.

2.4 PCS and E&A

2.4.1 Analyst_Notification

2.4.1.1 Description

The Analyst_Notification interface notifies the analyst that radiometric and geometric processing results are available for evaluation and analysis.

2.4.1.2 Format

Table 2-8. Analyst Notification Interface

Parameter	Type	Comment
Analyst_Notification		File Name

2.4.1.3 Data Transfer

Output from PCS to E&A.

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2.4.1.4 IPC Mechanism

The Analyst_Notification interface is passed by the PCS to the user via the database. The PCS uses a stored procedure to write the Analyst_Notification to the database. The user retrieves the Analyst_Notification from the database using an RDBMS forms package and stored procedures.

2.4.2 Work_Order_Instruction

2.4.2.1 Description

The Work_Order_Instruction interface requests PCS to resume or close out a work order based on the analysis performed.

2.4.2.2 Format

Table 2-9. Work Order Instruction Interface

Parameter	Type	Comment
W_O_Resume		Resumes existing work order
W_O_Close		Close existing work order

2.4.2.3 Data Transfer

Input to PCS from E&A. Sent by analyst at completion of evaluation and analysis of radiometric and geometric results.

2.4.2.4 IPC Mechanism

The Work_Order_Instruction interface is passed by the user interface to the PCS via the database. The user inserts work order continuation, or close, requests into the database via an RDBMS forms package and stored procedures. PCS uses a stored procedure to periodically poll the database and retrieve the Work_Order_Instruction.

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Section 3. E&A and RPS, GPS and DMS

The internal communications between the E&A Subsystem and RPS, GPS and DMS are through the IAS database. The IAS database maintains locations of files needed to perform evaluation and analysis of an image with regard to a given work order. The RPS and GPS generate:

1. Trending Statistics
2. Image Files and other flat files
3. Reports
4. Calibration Parameter File (CPF) current field values

These are input to E&A for review by the analyst. While certain algorithms generate current CPF field values, a direct match between the algorithm fields and the CPF fields, as well as the format for the CPF, is TBD.

3.1 E&A and RPS

3.1.1 Characterization_Calibration_Statistics

3.1.1.1 Description

The Characterization_Calibration_Statistics interface contains trending data resulting from the radiometric calibration and characterization processes in creating the Level 1R image.

3.1.1.2 Format

The trending data in Table 3-1 is based only on radiometric algorithms completed to date.

Table 3-1. Characterization/Calibration Statistics Interface Radiometry

Parameter	Type	Comment
Detector Saturation		
Total number of High and Low saturated minor frames per detector for the scene	integer	
Detector Inoperability		
Detectors SNR at specification radiance levels(high and low gain); out of spec detectors	DN and/or real	

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Detectors dynamic ranges (high and low gain); out of spec detectors Detectors dead/intermittent		
Characterize Random Noise		
Cal shutter data -standard deviations -average standard deviations	DN and/or real DN and/or real	Each line for each third, or whole scene, by detector in forward or reverse direction, or both scene or each third of the scene average of line standard deviations by detector in forward or reverse direction, or both
FASC data -means -means bias -SNR	DN and/or real DN and/or real DN and/or real	by detector and scan line by detector and scan line by detector and scan line
Night data -standard deviations -average standard deviations	DN and/or real DN and/or real	each line for each third, or whole scene, by detector in forward or reverse direction, or both scene or each third of the scene average of line standard deviations by detector in forward or reverse direction, or both

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Other scenes (ocean, snow, etc)		
-means	DN and/or real	by detector and scene
-means bias	DN and/or real	by detector and scene
-average standard deviations	DN and/or real	by detector and scene
Dark noise and night data as a function of time and temperature	DN and/or real	
Plots of NEDL vs L		
Histogram Analysis		
Detector gain ratios wrt. reference detector and average of all detectors		
- based on ratios of standard deviations	DN and/or real	
-based on ratios of means after bias removal	DN and/or real	
Bias offsets wtr. reference detector and average of all detectors	DN and/or real	
Number of pixels including total used per detector, and number excluded on high and low end		
Standard deviations of reference detector and average of all detectors by band	DN and/or real	
Gain ratios (based on both standard deviations and means) for forward and reverse scans	DN and/or real	
Saturation bins - at 0Rc and 0R	DN and/or real	
FFT magnitude (above background) at stripping related frequencies		
Process IC Data		
Mean shutter values per scan, with standard deviations of sample space over the instrument life time and over a		

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contiguous interval (within a single orbit)		
Integrated pulse values per scan		
Gains by scene, standard deviations and offsets by scan for each detector		
Uncertainties in gains, based on standard deviations of BB values		
Scene and Net offsets for each detector, for each gain state		
Uncertainties in offsets		
Noise levels of each reflective band detector (from Characterize Random noise functions)		
Fail and shutter flags, by line or by scene		
Lamp statistics - pulse height - pulse minima - pulse width - pulse location		
Shutter values		
Net pulse value and its standard deviation over the life time of the instrument and within a single orbit		
Instrument State trending - time since instrument was turned on - position in orbit - all recorded temperatures		
Characterize Memory Effect		
Height and ratios of spectral peaks		

Draft

Characterize Detector Operability		
Detector operability mask		1 value per detector
Characterize & Evaluate Relative Radiometry & Absolute Radiometry		
Trend tables and plots per band		
Characterize Detector Temperature Sensitivity		
Temp sensitivity coeffs.		

3.1.1.3 Data Transfer

Input to E&A from RPS. Trending data is made available to E&A by RPS through the IAS database to perform analysis and evaluation.

3.1.1.4 IPC Mechanism

The Characterization_Calibration_Statistics interface is passed to E&A from RPS via the database. RPS uses a database stored procedure to write the Characterization_Calibration_Statistics to the database. The E&A uses a stored procedure to retrieve the Characterization_Calibration_Statistics.

3.1.2 Image_Data

3.1.2.1 Description

The Image_Data interface contains the location of the L0Rc or 1R image data created during the Level 1R processing in RPS. The location of the image data and its related processing files are passed to E&A for evaluation. The format will also be passed as documented in a Data Format Control Book (DFCB) to be developed. E&A accesses the image data using HDF calls.

3.1.2.2 Format

Table 3-2. Image Data Interface - L0Rc & 1R

Image	Type	Comment
Lev_0Rc_Image		Location and format of file
Lev_1R_Image		Location and format of file

Draft

3.1.2.3 Data Transfer

Input to E&A from RPS. Location of image file is made available to E&A for analysis after L0R image is radiometrically corrected.

3.1.2.4 IPC Mechanism

The Image_Data interface is passed to E&A from RPS via the database. The RPS uses a database stored procedure to write the location of Lev_0Rc_Image or Lev_1R_Image to the database. The E&A uses a stored procedure to retrieve the image locations.

3.1.3 Reports

3.1.3.1 Description

The RPS generates reports as its algorithms are executed. The reports are stored in a directory with a file name that reflects the work order number associated with the image that was processed. The location is passed to E&A. The E&A operator opens the report file and displays the contents. The complete list of reports is TBD.

3.1.3.2 Format

Table 3-3. Reports - Radiometry

Report	Type	Comment
Histograms		Location
Means/Means bias		Location
Gain ratios		Location
Saturation bins		Location
Standard deviations		Location

3.1.3.3 Data Transfer

Input to E&A from RPS. Used in evaluation of the 1R image.

3.1.3.4 IPC Mechanism

The Reports interface is passed to E&A from RPS via the database. The RPS uses a database uses stored procedure to write the location of Reports to the database. The E&A uses a stored procedure to retrieve the Reports location.

Draft

3.2 E&A and GPS

3.2.1 Characterization_Calibration_Statistics

3.2.1.1 Description

The Characterization_Calibration_Statistics interface contains trending data resulting from the geometric calibration and characterization processes in creating the Level 1G image.

3.2.1.2 Format

The trending data in Table 3-3 is based only on geometric algorithms completed to date.

Table 3-3. Characterization/Calibration Statistics Interface Geometry

Parameter	Type	Comments
Attitude Stats		Attitude proc output
B2B stats		
Band Locations		Cal Parm update
Error Messages		Error conditions and messages
Geodetic Stats		Geo Char Summary Stats
I2I Stats		I2I Char Summary Stats
Innovation Sequence		
Mirror profile coeffs		Cal Parm update
Mirror scan stats		
MSCD trending data		E&A
MSCD validation stats		E&A
Orbit Sequence		
PCD trending data		E&A
PCD validation stats		E&A
Poly coeffs		
Processing Status		Routine process control status
Scan gap stats		

Draft

3.2.1.3 Data Transfer

Input to E&A from GPS. Trending data is made available to E&A by GPS through the IAS database to perform analysis and evaluation.

3.2.1.4 IPC Mechanism

The Characterization_Calibration_Statistics interface is passed to E&A from GPS via the database. GPS uses a database stored procedure to write the Characterization_Calibration_Statistics to the database. The E&A uses a stored procedure to retrieve the Characterization_Calibration_Statistics.

3.2.2 Image_Data

3.2.2.1 Description

The Image_Data interface contains the location of the Lev_1G_Image file created during the geometric correction process in GPS. The location of the image file and its related processing files are passed to E&A for evaluation. The format will also be passed as documented in a DFCB to be developed. E&A accesses the image data using HDF calls.

3.2.2.2 Format

Table 3-4. Image Data Interface - 1G

Parameter	Type	Comments
Lev_1G_Image		Location and format of file

3.2.2.3 Data Transfer

Input to E&A from GPS. The location of the image file is made available to E&A for analysis after the Level 1R image is geometrically corrected.

3.2.2.4 IPC Mechanism

The Image_Data interface is passed to E&A from GPS via the database. The GPS uses a database stored procedure to write the location of Lev_1G_Image to the database. The E&A uses a stored procedure to retrieve the Lev_1G_Image location.

3.2.3 Reports

3.2.3.1 Description

The GPS generates reports as its algorithms are executed. The reports are stored in a directory with a file name that reflects the work order number associated with the

Draft

image that was processed. The location is passed to E&A. The E&A operator opens the report file and displays the contents. The complete list of reports is TBD.

3.2.3.2 Format

Table 3-5. Reports - Geometry

Report	Type	Comment
Geometric Accuracy	ASCII Text	Visual stats, GCP resids, poly residuals
Mirror Calibration	ASCII Text	Mirror stats, mirror coeffs
Image Registration	ASCII Text	I2I residuals, I2I stats
Geodetic Accuracy	ASCII Text	Geodetic stats, precision solution residuals
Alignment Calibration	ASCII Text	State file, Att, Orb, Inno Seq, Align Mat
B2B Calibration	ASCII Text	B2B residuals, Band center locs
B2B residuals	ASCII Text	B2B char test point measurement
Band Registration	ASCII Text	B2B Stats, B2B residuals
Precision solution	ASCII Text	
Precision solution residuals	ASCII Text	
ETM+ Model	ASCII Text	
State file	ASCII Text	

3.2.3.3 Data Transfer

Input to E&A from GPS. Used in evaluation of the 1G image.

3.2.3.4 IPC Mechanism

The Reports interface is passed to E&A from GPS via the database. The GPS uses a database stored procedure to write the location of Reports to the database. The E&A uses a stored procedure to retrieve the Reports location.

Draft

3.3 E&A and DMS

3.3.1 L0R_QC_Statistics

3.3.1.1 Description

The L0R_QC_Statistics interface provides trending statistics on the PCD, MSCD and image processing files. These statistics are created by DMS when performing the quality check upon arrival into the IAS system.

3.3.1.2 Format

Table 3-6. L0R QC Statistics Interface

Parameter	Type	Comments
PCD Stats		
MSCD Stats		
Scan Gap Stats		
Telemetry Trending Stats		

3.3.1.3 Data Transfer

Input to E&A from DMS. Used in evaluation and analysis of RPS and GPS processing results.

3.3.1.4 IPC Mechanism

The L0R_QC_Statistics interface is passed to E&A from DMS via the database. DMS uses a database stored procedure to write the L0R_QC_Statistics to the database. E&A uses a stored procedure to retrieve the L0R_QC_Statistics.

3.3.2 Reports

3.3.2.1 Description

E&A generates its own reports and sends the locations of the files through the Report interface to DMS. The complete list of reports and the exact interface is TBR.

3.3.2.2 Format

Table 3-7. Reports Interface

Reports	Type	Comments
Detector Operability		

Draft

Radiometric Accuracy		
Streaking and Banding		
Correlated and Coherent Noise		
MTF		
SNR		
Geometric Accuracy	ASCII Text	Visual stats, GCP resids, poly residuals
Mirror Calibration	ASCII Text	Mirror stats, mirror coeffs
Image Registration	ASCII Text	I2I residuals, I2I stats
Geodetic Accuracy	ASCII Text	Geodetic stats, precision solution residuals
Alignment Calibration	ASCII Text	State file, Att, Orb, Inno Seq, Align Mat
LPS Data Quality		
Level 0R data and products		
Level 1R data quality		
PCD quality		
Selected Trend Analyses		

3.3.2.3 Data Transfer

Output from E&A to DMS. Reports are sent periodically.

3.3.2.4 IPC Mechanism

The Reports interface is passed from E&A to DMS via the database and flat files. E&A creates the Reports on disk and uses a database stored procedure to write the location of the Reports to the database. DMS uses a stored procedure to periodically poll the database and retrieve the Reports.

Draft

Section 4. DMS and RPS/GPS/E&A

The internal communications between DMS and the RPS, GPS and E&A are through the IAS database. Allocation of space for storage of files and reports, as well as their distribution, are performed by the DMS under the control of the PCS. Locations of the file and reports are maintained in the IAS database from which all subsystems can access the appropriate data to perform their work.

4.1 DMS and RPS/GPS/E&A

4.1.1 Image_Data

4.1.1.1 Description

The Image_Data interface provides the location of the Lev_0R_Image data to the RPS, GPS and E&A. Each subsystem accesses the image data using HDF calls. The HDF format is found in the Landsat 7 0R Distribution Product DFCB, 430-11-06-007-0, October 1996.

4.1.1.2 Format

Table 4-1. Image Data Interface - L0R

Image	Type	Comments
Lev_0R_Image		Location and format

4.1.1.3 Data Transfer

Output from DMS to RPS, GPS and E&A.

4.1.1.4 IPC Mechanism

The Image_Data location interface is passed from DMS to RPS and E&A via the database. The DMS uses database stored procedures to write the location of Image_Data to the database. The RPS and E&A use a database stored procedure to retrieve the Image_Data location from the database.

4.1.2 Ancillary

4.1.2.1 Description

The Ancillary interface provides the location of the ancillary data received with the Level OR product and the FDF ephemeris received from the MOC. This data is used by the RPS, GPS and E&A. DMS stores the data for processing during ingest.

Draft

4.1.2.2 Format

Table 4-2. Ancillary Interface

Data	Type	Comments
PCD Data		Location
MSCD Data		Location
FDF Ephemeris		Location

4.1.2.3 Data Transfer

Output from DMS to RPS, GPS and E&A.

4.1.2.4 IPC Mechanism

The Ancillary interface is passed to RPS, GPS and E&A from DMS via the database. The DMS uses a database stored procedure to store the location of the Ancillary data in the database. The RPS, GPS and E&A use a database stored procedure to retrieve the location of the Ancillary data.

4.1.3 Cal_Parm_File

4.1.3.1 Description

The Cal_Parm_File interface sends updates for radiometric and geometric changes to the Calibration Parameter File during processing by RPS and GPS. The file is also viewed by E&A. The format for the Calibration Parameter File is TBR. At a minimum, the location of the file will be stored in the IAS database.

4.1.3.2 Format

Table 4-3. Calibration Parameter File Interface

Parameter	Type	Comment
Calibration_Parameter_File		Landsat 7 Calibration Parameter File Definition, 430-15-01-002-0, Nov 1996

4.1.3.3 Data Transfer

Input to DMS from RPS and GPS.

4.1.3.4 IPC Mechanism

The Calibration_Parameter_File interface is passed from RPS and GPS to DMS. Mechanism is TBR.

Draft

Section 5. RPS and GPS

5.1 RPS and GPS

5.1.1 Lev_1R_Image

5.1.1.1 Description

The Lev_1R_Image contains the location of the Level 1R image generated by RPS calibration and characterization processing. This is passed to GPS for geometric processing. The format will also be passed as documented in a DFCB to be developed. GPS will access the image data through HDF calls.

5.1.1.2 Format

Table 5-1. Level 1R Image Interface

Parameter	Type	Comment
Lev_1R_Image		Location and format

5.1.1.3 Data Transfer

Output from RPS to GPS. Sent to GPS at completion of radiometric processing.

5.1.1.4 IPC Mechanism

The Lev_1R_Image location interface is passed from RPS to GPS via the database. The RPS uses a stored procedure to write the Lev_1R_Image location to the database. The GPS uses a stored procedure to retrieve the Lev_1R_Image location from the database.